FINAL CLEANUP ACTION PLAN
BOTHELL LANDING SITE
BOTHELL, WASHINGTON

City of Bothell

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Toxics Cleanup Program
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EXECUTIVE SUMMARY

This document presents the final Cleanup Action Plan (FCAP) for the Bothell Landing Site in Bothell, Washington. This final CAP was prepared by the Washington State Department of Ecology (Ecology) in collaboration with the City of Bothell. This FCAP has been prepared to meet the requirements of the Model Toxics Control Cleanup Act (MTCA) administered by Ecology under Chapter 173-340 of the Washington Administrative Code (WAC). This FCAP describes Ecology's proposed cleanup action for this site and sets forth the requirements that the cleanup must meet.

Background

The Bothell Landing Site is located along Bothell Way NE / SR 522 at its (past and current) intersection with Bothell Way NE/ former SR 527, in Bothell, Washington. The Site formerly housed a strip mall, restaurants, and historic gas stations, with multiple former petroleum underground storage tanks (USTs). The City acquired properties on which the Site lies in 2008 for construction of the SR 522 realignment, and entered into an Agreed Order with Ecology in 2009. Remedial investigation activities were initiated in 2009, and finalized in 2016. Interim action soil cleanups for petroleum hydrocarbons were conducted in 2010, 2013, 2014, 2015, and 2017 at the Site. Chemicals of concern (COCs) at the Site following the interim action cleanups are:

- Soil: Gasoline-range petroleum hydrocarbons, benzene
- Ground water: arsenic

Cleanup Action Overview

The selected remedy for the Site is a combination of excavation of contaminated soils (already completed as interim actions), engineering controls (capping under roadways) and institutional controls (environmental covenants restricting access to soil and ground water), as described below:

1. Remnant petroleum contaminated soil under roadway – leave in place and implement:
   - Engineering controls – paved SR 522 roadway capping petroleum impacted soils
   - Institutional controls – implement environmental covenants for area shown in Figure 2
2. Ground water arsenic – include institutional controls in new environmental covenant for the arsenic impacted area (shown in Figure 2) and provide compliance monitoring for ground water with option to remove arsenic from the covenant if monitoring shows naturally elevated concentrations unrelated to historical or current contamination at the Site.

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1 INTRODUCTION

1.1 PURPOSE

This document is the final Cleanup Action Plan (FCAP) for the Bothell Landing Site located in Bothell, Washington. The general location of the Site is shown in Figures 1 and 2. An FCAP is required as part of the site cleanup process under Chapter 173-340 WAC, Model Toxics Control Act (MTCA) Cleanup Regulations. The purpose of the FCAP is to identify the proposed cleanup action for the Site and to provide an explanatory document for public review. More specifically, this plan:

- Describes the Site
- Summarizes current site conditions;
- Summarizes the cleanup action alternatives considered in the remedy selection process;
- Describes the selected cleanup action for the Site and the rational for selecting this alternative;
- Identifies site-specific cleanup levels and points of compliance for each hazardous substance and medium of concern for the proposed cleanup action;
- Identifies applicable state and federal laws for the proposed cleanup action;
- Identifies residual contamination remaining on the site after cleanup and restrictions on future uses and activities at the site to ensure continued protection of human health and the environment;
- Discusses compliance monitoring requirements; and
- Presents the schedule for implementing the CAP.

Ecology has made a preliminary determination that a cleanup conducted in conformance with this CAP will comply with the requirements for selection of a remedy under WAC 173-340-360.

1.2 PREVIOUS STUDIES

Previous studies at the Site include the following:

HWA GeoSciences, 2007b, *Phase II Environmental Site Assessment Beta Bothell Landing Property, Bothell, Washington*. Prepared for City of Bothell, November 1, 2007.

HWA GeoSciences, 2009a, *Remedial Investigation and Feasibility Study Work Plan, Bothell Landing Property, Bothell, Washington*. Prepared for City of Bothell, August 26, 2009.

HWA GeoSciences, 2009b, *Aquifer Testing and Permeability Estimates, Bothell Crossroads RI/FS, Bothell, Washington*. Prepared for City of Bothell, October 6, 2009.

HWA GeoSciences, 2011a, *Documentation of Interim Action at Bothell Landing Site, Bothell, Washington.* Prepared for City of Bothell, February 2, 2011.

HWA GeoSciences, 2011b, *Remedial Investigation Feasibility Study Final Work Plan, Bothell Landing Site Bothell, Washington*, September 19, 2011. Includes Ecology Amendment No. 1 to Agreed Order.

HWA GeoSciences, 2014a, *Letter Report: Bothell Landing Interim Action Status Report, January – March 2014, Bothell, WA,* dated April 7, 2014.

HWA GeoSciences, 2014b, Addendum 2 to August 20, 2014 Letter Re: Area Wide Ground Water Monitoring Network, Bothell Agreed Order Sites, Bothell, Washington. Letter dated August 27, 2014.

HWA GeoSciences, 2014c, Area Wide Ground Water Monitoring Network, Bothell Agreed Order Sites, Bothell, WA. Letter Dated August 22, 2014.

HWA GeoSciences, 2014d, *Interim Action Cleanup Action Report, Bothell Landing Site, Bothell, WA*, Dated September 2, 2014.

HWA GeoSciences, 2014e, *Area Wide Ground Water Monitoring, Second Round Results, Bothell Agreed Order Sites, Bothell, WA.* Letter Dated October 17, 2014.

HWA GeoSciences, 2015a, *Area Wide Ground Water Monitoring, Third Round Results, Bothell Agreed Order Sites, Bothell, WA.* Letter Dated January 16, 2015.

HWA GeoSciences, 2015b, *Area Wide Ground Water Monitoring, Fourth Round Results, Bothell Agreed Order Sites, Bothell, WA.* Letter Dated April 16 2015.

HWA GeoSciences, 2015c, *Addendum No. 1 to Interim Action Cleanup Report, (HWA, 9/1/14) Bothell Landing Site, Bothell, WA,* Dated November 6, 2015.

Kleinfelder, 1999, *Phase II Soil and Ground Water Exploration, Bothell Landing Shopping Plaza, Bothell, Washington*. Prepared for Buck & Gordon, LLP, Seattle, WA, September 8, 1999.

Parametrix, 2009a, *Bothell Landing Remedial Investigation/Feasibility Study, Revision No. 0*. Prepared for City of Bothell, November 2009.

Parametrix, 2009b, *Bothell Landing Draft Cleanup Action Plan, Revision No. 1,* Prepared for City of Bothell, December 2009.

Parametrix, 2010a, *Technical Memorandum, Responses to Ecology Comments: Bothell Landing Draft RI/FS and CAP,* dated March 10, 2010.

Parametrix, 2010b, *Interim Action Work Plan, Bothell Landing Site, Revision No.2,* Prepared for City of Bothell, April 2010.

Riley Group, *Draft Phase I Environmental Site Assessment, Bothell Landing Property #1*, May 29, 2007.

1.3 REGULATORY FRAMEWORK

The draft CAP was conducted under Agreed Order DE 6294, dated February 3, 2009, as amended by Amendment No. 1 to Agreed Order, dated June 9, 2010, between the City of Bothell (City) and the Washington State Department of Ecology (Ecology) to address soil and ground water contamination related to historical releases of hazardous substances at the Site. Requirements under the Agreed Order include performance of a remedial investigation/feasibility study (RI/FS) and development of a draft CAP.

There are no other local, state or federal regulatory actions at the site.

2 SITE DESCRIPTION

2.1 SITE HISTORY

Details of historic property use and the several site assessments performed to date at the Site can be found in Kleinfelder (1999), Riley Group (2007), ECOSS (2008), HWA (2007, 2009a), and Parametrix (2009a). The following is a summary of those assessments.

Two service stations were previously located at the northeast and northwest corners of the Site between the 1930's and 1970's. The stations were demolished during site reconstruction in the 1970's and the underground storage tanks (USTs) associated with the stations were reported to have been removed (Riley Group, 2007).

Prior to 2009, the former 2.8 acre Bothell Landing property was occupied by two, single-story restaurants in the northeast and northwest corners of the property and two, multi-tenant retail and office buildings in the southern portion of the property. The remainder of the property was covered with asphalt-paved parking and landscaping. The buildings were demolished in May 2010 in advance of soil cleanup work and subsequent construction of the new roadway. The remnant portions of the property and vacated former SR 522 roadway have been conjugated into new City parcels and are being sold to private parties for redevelopment; the southern portion of the property will become a part of the expanded park. The restaurants and retail buildings were excluded as possible sources of contamination, whereas the service stations were not. Extensive subsequent RI explorations confirmed this.

In 1998, the City purchased the north-central portion of the site at 10001 Woodinville Way as part of a roadway widening and the Rotunda Park project. In the course of site excavation, five USTs and associated petroleum-affected soils were discovered. The USTs were assumed to have been associated with one of the former service stations. The City removed approximately 385 tons of petroleum-affected soils from the Site. Petroleum hydrocarbon and aromatic hydrocarbon concentrations remaining in the excavation sidewalls exceeded Ecology's Model Toxics Cleanup Act (MTCA) cleanup levels. The excavation was backfilled with clean imported soils. A plastic sheeting barrier was placed around the excavation limits to minimize recontamination of soil from adjacent impacted soils.

The remaining (non-City owned at the time) parcels comprising the Site were investigated by Kleinfelder (1999) who identified gasoline, diesel, oil, and benzene in soil and ground water at the Site. The property owners at the time filed a restrictive covenant in January 2002 acknowledging that impacted soils and ground water remained at the property. Ecology issued an interim No Further Action (NFA) determination for the Site in 2002 for soils only. The Site was later removed from the Voluntary Cleanup Program in 2006 due to the lack of further activity, such as monitoring or remediation. The 2002 NFA determination was also rescinded at this time due to cleanup exceedances.

HWA performed a Phase II environmental site assessment in 2007. The assessment identified soils in the northern portion of the property (vicinity of the known UST releases) containing petroleum-related compounds (petroleum hydrocarbons, aromatic hydrocarbons, and semi-volatile organic compounds) exceeding Ecology MTCA Method A cleanup levels (Table 740-1 in WAC 173-340-900). Ground water at the Site apparently was affected by multiple sources. Petroleum hydrocarbon impacts to ground water from historic UST releases at the property appeared to be limited. Chlorinated solvents were detected in ground water samples at the northwest and northeast portions of the property. These detections appeared to be from an upgradient source located north-northeast of the Site (the Ultra Custom Care Cleaners site, which is under a separate Agreed Order between the City and Ecology.)

Parametrix's 2009 remedial investigation concluded that petroleum contamination in soil and ground water at the former gas station area was relatively well defined within the (then) property boundaries; however, soil contamination extended into the (then) SR 522 right-of-way where it was less well defined. The extent of the petroleum-contaminated ground water plume was limited to the vicinity of the former Rotunda Park. The backfill around the Horse Creek culvert (see Figure 2) did not appear to be a preferential pathway for contaminated ground water. Surface water in the open channel portion of Horse Creek did not appear to be significantly affecting nearby surface soils or ground water. Halogenated volatile organic compounds (HVOCs) including tetrachloroethene (PCE), trichloroethene (TCE), and breakdown products, were present in ground water throughout the central and northern portions of the Site with concentrations generally below MTCA Method A cleanup levels (Table 720-1 in WAC 173-340-900). One location at the southeast corner of the Rotunda Park area contained vinyl chloride in ground water exceeding the MTCA cleanup level. Concentration distributions indicated that the HVOCs were migrating to the Site from an upgradient source (the Ultra Custom Care Cleaners site).

Interim action petroleum hydrocarbon soil cleanups were conducted in two phases; the first one in 2010; and the second one in 2013/2014/2015/2017, after the realignment of the SR522 roadway now crossing the Site. This phasing was necessary in order to effectively manage access to contaminated soils beneath the old (operational in 2010) and the new (operational in 2013) roadways, with minimal impacts to traffic. The interim action cleanups were performed in compliance with the terms and conditions of the 2009 Agreed Order as amended between Ecology and the City. Figure 3 shows the extents of the interim action cleanups.

2.2 HUMAN HEALTH AND ENVIRONMENTAL CONCERNS

2.2.1 Conceptual Site Model

The conceptual model for the Site identifies the primary contaminant sources, release mechanisms, transport mechanisms, secondary contaminant sources, potential pathways, and

exposure routes. Existing chemical data, site characterization data, and identification of potential human and ecological receptors were used to develop the model are shown on Figure 4.

2.2.2 Primary Sources of Contamination and Primary Release Mechanisms

The primary contaminant sources are the former leaking USTs. The primary contaminants are petroleum hydrocarbons, with release mechanisms of tank leakage or spills to soil and ground water.

2.2.3 Secondary Sources And Release Mechanisms

Secondary sources and release mechanisms, based on the RI data are limited to leaching from soil to ground water of TPH, as no air or surface water impacts were identified.

2.2.4 Pathways And Potential Receptors

Potential exposure routes for human and ecological receptors include the following:

Dermal/Direct Contact – Exposure to chemicals in soil may occur through direct contact with soil. Direct contact is a potential exposure route for current and future on-site workers or visitors. Burrowing or ground-dwelling mammals and invertebrates may be exposed directly to the soil contaminants.

Inhalation – Particulates from soil can be transported by air and inhaled by potential on-site and off-site receptors. Emissions of volatile chemicals from soil and ground water may also be transported as vapors by air. Terrestrial biota could also be exposed to chemicals volatilizing to outdoor air, but if this exposure actually occurs the duration of exposure would be expected to be relatively short. Burrowing animals may be exposed to volatile air contaminants in underground stagnant air while spending time within the burrow.

Ingestion – Ingestion of chemicals in Site soil is a primary exposure route for human and ecological receptors. Uptake by plants is also a potential exposure route.

Potentially complete exposure pathways after completion of the Interim Actions are::

Soil - TPH:

- Current/future construction/utility worker
    - Incidental soil ingestion and dermal contact

Remaining soil impacts are located under an active roadway, therefore the only potential receptors are future construction workers.

Ground water – Arsenic:

- Current/future construction/utility worker:
    - Direct ingestion of contaminated ground water
- Ecological receptors
    - Dermal contact with ground water in a burrow

Remaining ground water impacts are limited to arsenic in ground water, which is generally greater than 6 feet below grade in the areas impacted, therefore park visitors or others are unlikely to be exposed to any ground water, as there are no drinking water wells and it is not planned or legal to install any in the impacted area. The only potential human receptors would be future construction workers involved in excavation below ground water level or dewatering work.

Vapor - TPH:

- Current/future construction/utility worker:
    - Inhalation of vapors from the subsurface (ground water and soil) in outdoor air
- Ecological receptors
    - Inhalation of vapors from the subsurface (ground water and soil) in a burrow

Remaining vapor impacts are located under an active roadway, therefore the only potential human receptors would be future construction workers involved in excavation or dewatering work. Arsenic in ground water does not pose a vapor risk, therefore there are no vapor-related risks in park-zoned areas.

2.3 CLEANUP STANDARDS

2.3.1 Contaminants of concern

2.3.1.1 Soil COCs

Based on the studies before the interim cleanups, chemicals of potential concern (COPCs) in Site soil were:

- HVOCs (primarily PCE, TCE, (cis)-1,2-DCE, and vinyl chloride)
- Total petroleum hydrocarbons (gasoline-, diesel- and motor oil-range)
- BTEX (benzene, toluene, ethylbenzene, and xylenes)
- Lead
- Polycyclic aromatic hydrocarbons (PAHs) (including naphthalenes)

The *Interim Action Work Plan* (Parametrix, 2010b) also included other metals (arsenic, cadmium, chromium, mercury, selenium, and silver) and polychlorinated biphenyls (PCBs) as COPCs. Because PCBs, HVOCs, arsenic, barium, cadmium, chromium, lead, mercury, selenium, or silver were never detected in Site soil at concentrations exceeding MTCA Method A or B

cleanup levels or natural background concentrations during the Phase II ESA, RI, or the two initial interim action cleanups, they were dropped as COPCs during subsequent cleanup and RI activity.

Following the interim action soil cleanups, only one area had soils remaining on Site with cleanup level exceedances, namely the area of L-PEX-8-10 (under the Horse Creek culvert). The sample had gasoline and benzene concentrations exceeding Site cleanup levels.

Thus soil chemicals of concern (COCs) remaining on Site are:

- Total petroleum hydrocarbons, gasoline-range
- Benzene

2.3.1.2 Ground Water COCs

COPCs for ground water in the RI area before the interim cleanups were:

- HVOCs
- Total petroleum hydrocarbons (gasoline-, diesel- and motor oil-range)
- BTEX
- Metals (arsenic, cadmium, chromium, and lead)

Ground water monitoring data following the soil cleanups indicate the following COCs remain on Site:

- Arsenic

The HVOC contamination originating from an off Site source is not considered to be a COC at the Site requiring site-specific remediation because cleanup at the Ultra Cleaners Agreed Order Site will remedy HVOC ground water contamination at the Bothell Landing site.

2.3.2 Cleanup Levels

Cleanup levels for COCs that need to be addressed by the cleanup in affected media at the site (soil and ground water) are presented in Section 4.3.

3 CLEANUP ACTION ALTERNATIVES AND ANALYSIS

3.1 CLEANUP ACTION ALTERNATIVES

The initial technologies screened for contaminated soil under the Horse Creek culvert include:

- Excavation and removal
- In-situ bioremediation
- Monitored natural attenuation
- Engineering and institutional controls

The initial technologies screened for arsenic contaminated ground water at the Site were:

- Excavation and removal
- In-situ chemical fixation
- Institutional controls

Cleanup alternatives (assembled from the selected cleanup technologies) considered for addressing residual petroleum contaminated soil under the Horse Creek culvert were:

- Excavation and removal with monitored natural attenuation
- In-situ bioremediation with monitored natural attenuation and engineering / institutional controls
- Engineering and institutional controls

Cleanup alternatives considered for arsenic contaminated ground water at the Site were:

- In-situ chemical fixation with institutional controls
- Institutional controls

3.2 INITIAL SCREENING OF ALTERNATIVES

The selected alternative for both petroleum and arsenic impacts was engineering and institutional controls. The other alternatives (excavation and removal with monitored natural attenuation, in-situ bioremediation with monitored natural attenuation and engineering / institutional controls, and in-situ chemical fixation with institutional controls) were eliminated during the screening process due to efficacy, and cost-to-benefit ratios evaluated via a disproportionate cost analysis.

3.3 DETAILED EVALUATION OF ALTERNATIVES

The preferred alternative was recommended in accordance with remedy selection requirements under MTCA, and meets all threshold and other requirements specified in WAC 173-340-360.

The selected alternative was evaluated for compliance with the following, as detailed in the RI/FS:

- The minimum requirements in WAC 173-340-360(2)(a)&(b)
  - Protection of human health and the environment
  - Compliance with cleanup standards
  - Compliance with ARARs
  - Provide for compliance monitoring
  - Use of permanent solutions to the maximum extent practicable (see also WAC 173-340-360(3))
  - Provide for a reasonable restoration timeframe (see also WAC 173-340-360(4))
  - Consideration of public concerns
- WAC 173-340-360(2)(c) Requirements for ground water cleanup actions
- WAC 173-340-360(2)(e) Requirements for institutional controls (see also WAC 173-340-440)

4 DESCRIPTION OF SELECTED REMEDY

4.1 SITE DESCRIPTION

The Bothell Landing Site was defined in the Agreed Order (prior to completion of the RI) as consisting of the extent of contamination caused by the release of hazardous substances at a location generally south of the intersection of SR 522 and SR 527 as they existed at the time the Agreed Order was signed. The Site is in the vicinity of a former 2.8-acre property where petroleum hydrocarbon impacts were discovered. The 2.8-acre parcel no longer exists in its original configuration, although the City currently owns that land, which includes public rights-of-way for the newly constructed and re-aligned SR 522 and Bothell Way NE, and portions of three newly formed parcels on the east, west, and south sides of the new "T" intersection, two of which include portions of the now vacated, former SR 522 roadway. Current City-owned parcels that now contain a portion of the former 2.8-acre Bothell Landing parcel are:

- Northeast corner – Lot E, F, G
- Northwest corner – Lot D
- South part – City park land (Park at Bothell Landing)

The City acquired the original 2.8-acre Bothell Landing property through two property purchases, 1) in 1998 for roadway widening and construction of a small park (Rotunda Park), and 2) in 2008 for construction of the SR 522 realignment. A 48-inch diameter concrete culvert conveyed Horse Creek through the northern and eastern portion of the property, and daylighted just beyond the east property boundary. Flow to this drainage was re-routed to a new drainage system (consisting of pipes and open channel segments) constructed some 300 feet west of the old Horse Creek channel, in 2016. Figure 2 shows the former and new locations of the Horse Creek Channel.

4.2 DESCRIPTION OF THE CLEANUP ACTION

Based on the results of the remedial investigation and feasibility study conducted under MTCA and the application of the selection of remedy criteria, the preferred cleanup alternatives for contaminated soil and ground water at the Site (developed in accordance with WAC 173-340-350 through 173-340-390) includes:

1. Contaminated soil on site prior to interim actions – adopt interim actions as the final cleanup
2. Remnant contaminated soil under roadway – leave in place and implement:
   - Engineering controls – paved SR 522 roadway capping petroleum impacted soils.
   - Institutional controls – implement environmental covenants for area shown in Figure 2)

3. Ground water arsenic – include institutional controls in new environmental covenant for the arsenic impacted area and provide compliance monitoring for ground water with option to remove arsenic from the covenant if monitoring shows naturally elevated concentrations unrelated to historical or current contamination at the site. For arsenic in ground water, the institutional control could consist of an environmental covenant that documents remaining arsenic contamination in ground water, prohibits withdrawal and use for any purpose other than monitoring, site investigation, or construction-related activities with notification and approval by Ecology. A request to lift the covenant can be made to Ecology if compliance monitoring from the site shows that the arsenic persists after historical ground water contamination and the petroleum hydrocarbon contamination has not been detected for an appropriate period of time (eight quarters of monitoring). If arsenic remains at elevated concentrations over a sufficiently long time period with no other detections of petroleum hydrocarbon or solvent contamination, this data can be used to demonstrate that the elevated concentrations represents a locally high natural background for arsenic. Based on this evidence, a request can be made to remove the institutional controls for ground water at the site.

The RI indicates that HVOCs in ground water at the northern portion of the Site are from the Ultra Custom Care Cleaners site, located 200 feet north and upgradient of the Site. PCE, trichloroethene (TCE), vinyl chloride (VC), and cis-1,2-dichloroethene (1,2-DCE) were detected at concentrations exceeding MTCA cleanup levels in several Site wells and numerous upgradient wells leading to the source area at the Ultra Custom Care Cleaners site. The Ultra Custom Care Cleaners site is also owned by the City, and is undergoing investigation cleanup under a separate Agreed Order with Ecology (Agreed Order DE 9704).

For ground water, the HVOC issues will be addressed under the Ultra Custom Care Cleaners Agreed Order.

There are currently no buildings over the affected areas at the Site. If buildings are planned prior to cleanup in those areas, VI assessment will be conducted under the Ultra Custom Care Cleaners Agreed Order and appropriate vapor mitigation measures implemented for the buildings (e.g., vapor barriers, sub-slab depressurization systems, etc.)

4.3 CLEANUP STANDARDS AND POINT OF COMPLIANCE

Cleanup standards consist of appropriate cleanup levels applied at a defined point of compliance that meet applicable state and federal laws (WAC 173-340-700). Cleanup levels are described below.

4.3.1 Soil

Soil remediation levels proposed in the *Interim Action Work Plan* (Parametrix, 2010b) include:

- MTCA Method A Soil Cleanup Levels for Unrestricted Land Use (WAC 173-340, Table 740-1).
- MTCA Method B TPH Soil Cleanup Levels for direct contact and protection of ground water

An evaluation of Method B risk-based TPH soil cleanup levels for the Site was specified in Section 3.1.1.1 of the *Compliance Monitoring Quality Assurance Project Plan* (CMQAPP) appendix of the *Interim Action Work Plan* (Parametrix, 2010b). The CMQAPP called for characterization of TPH-impacted soil via analysis of petroleum hydrocarbon fractionation and other target compounds in order to evaluate whether the standard MTCA Method A soil cleanup levels were appropriate for the Site compared to MTCA Method B risk-based soil TPH cleanup levels. The results of the petroleum hydrocarbon fractionation analyses (NWVPH/NWEPH analysis) were input into Ecology's MTCA TPH 11.1 spreadsheet model to determine TPH soil cleanup levels protective of human health via direct contact and via leaching to a source of potable ground water. HWA's evaluation of MTCA Method B risk-based cleanup levels for TPH-impacted soil at the Site is included in Appendix F. The calculated Method B cleanup levels for gasoline-range petroleum hydrocarbons at the Site range between 84 and 246 milligrams per kilogram (mg/kg) depending on the mixture of hydrocarbon fractions and specific compounds such as benzene. The Method B TPH cleanup level of 84 mg/kg is a calculated value for protection of potable ground water from contamination by benzene based upon Ecology's three-phase partitioning model (Equation 747-1 in WAC 173-340-747). The MTCA Method A cleanup level for gasoline-range petroleum hydrocarbons with detectible benzene in soil is 30 mg/kg. The calculated Method B cleanup levels for diesel- and oil-range petroleum hydrocarbons at the Site range between 3,130 and 5,225 mg/kg depending on the mixture of hydrocarbon fractions and specific compounds.

The resulting soil remediation levels used (i.e., the more stringent of Method A or B) meet all the requirements of WAC 173-340-720 through 173-340-760 and should be considered the Site cleanup levels. Soil cleanup levels are summarized below:

Compound	Cleanup level (mg/kg)
TPH Diesel	2000 A
TPH Oil	2000 A
Gasoline	100/30 A*
Benzene	0.03 A
Xylenes	9 A
Arsenic	20 A

A – MTCA Method A soil cleanup level

* Gasoline mixtures without benzene and the total of ethyl benzene, toluene and xylene are less than 1% of the gasoline mixture = 100 mg/kg, all other gasoline mixtures = 30 mg/kg

4.3.2 Ground Water

Appropriate levels of cleanup for ground water are determined by the highest beneficial use of that ground water. Shallow ground water present at the Site is not currently used for drinking water, and no water wells are located downgradient of the Site. The appropriate ground water cleanup levels for the Site are MTCA Method A for ground water for almost all the COCs; however, for ground water arsenic, a cleanup level of 10.0 µg/L will be used based on the drinking water standard. Ground water cleanup levels are summarized below:

Compound	Cleanup level (µg/L)
TPH Gas	800
TPH Diesel	500
TPH Oil	500
Arsenic	10

4.3.3 Point of Compliance

The point of compliance is the specific location(s) at which a particular cleanup level must be met in order to demonstrate compliance of a cleanup action. MTCA defines standard and conditional points of compliance.

4.3.3.1 Soil

The standard soil point of compliance under MTCA (WAC 173-340-740 (6)(b-(d))) is:

- For soil cleanup levels based on protection of ground water, the point of compliance shall be established throughout the Site
- For soil cleanup levels based on protection from vapors, the point of compliance shall be established throughout the Site from the ground surface to the uppermost ground water saturated zone
- For soil cleanup levels based on human exposure via direct contact or other exposure pathways where contact with the soil is required to complete the pathway, the point of compliance shall be established in the soils throughout the Site from the ground surface to 15 feet bgs.

MTCA recognizes that, for cleanup actions that involve containment or capping, cleanup levels may not be met at the standard point of compliance, but the cleanup action would be determined to comply with cleanup standards provided:

- The selected remedy is permanent to the maximum extent practicable
- The cleanup action is protective of human health and terrestrial ecological receptors
- Institutional controls are implemented to limit activities that could interfere with the long-term integrity of the containment system
- Compliance monitoring and periodic reviews are conducted
- The capped or contained COCs and measures to prevent migration and contact with them are specified in a CAP

The cleanup alternatives are evaluated based on standard soil point of compliance for removal and treatment alternatives (WAC 173-340-740(6)(a)-(e), and for containment remedies (WAC 173-340-740(6)(f)).

4.3.3.2 Ground Water

The standard ground water point of compliance under MTCA (WAC 173-340-720(8)(b)) is in ground water throughout the Site from the uppermost level of the saturated zone to the lowest depth which could potentially be affected.

For this Site, the standard ground water point of compliance is proposed for arsenic impacts, i.e., ground water throughout the Site.

4.4 APPLICABLE, RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

Cleanup actions under MTCA (WAC 173-340-710) require the identification of all applicable or relevant and appropriate requirements (ARARs). These requirements are defined as:

"Applicable" requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a site.

"Relevant and appropriate" requirements means those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a site, address problems or situations sufficiently similar to those encountered at the site that their use is well suited to the particular site.

The potential ARARs for the Site include three types:

- Chemical-specific
- Location-specific
- Action-specific

Chemical-specific ARARs are typically health- or risk-based values that when applied to site-specific conditions represent cleanup standards. Location-specific ARARs are related to the geographical position and/or physical condition of the site and may affect the type of remedial action selected. Action-specific ARARs are usually technology-based or activity-based requirements or limitations on actions or conditions taken with respect to specific hazardous substances. The action-specific requirements do not determine the selected remedial alternative, but indicate how or to what level a selected alternative must perform.

Potential ARARs were identified for each medium of potential concern. These potential ARARs are shown in Table 1.

4.5 RESTORATION TIMEFRAME

TPH in soil - The interim action soil cleanups (which are adopted as the final soil cleanup) were completed in 2017. The engineering controls (i.e., capping) were implemented during final SR 522 roadway construction, in 2013. Institutional controls (environmental covenant) are anticipated to be implemented once the final Agreed order is effective.

Arsenic in ground water - Institutional controls (environmental covenant) and monitoring are anticipated to be implemented once the final Agreed Order is effective.

4.6 COMPLIANCE MONITORING

Compliance monitoring requirements (specified in WAC 173-340-410) include the following elements:

- Protection monitoring to confirm that human health and the environment are adequately protected during implementation of an alternative
- Performance monitoring to confirm that cleanup standards or other performance standards are met
- Confirmation monitoring to monitor the long-term effectiveness of the remedy after completion of the alternative

Petroleum In Soil – Site ground water is in compliance for petroleum hydrocarbons, therefore no further compliance monitoring is required.

Arsenic in Ground Water - The institutional control remedy for arsenic in ground water provides for compliance monitoring by quarterly ground water monitoring for two years. Remaining arsenic impacts to ground water are in wells BLMW-11, BLMW-12, and MW-1.

A Compliance Monitoring Plan will be submitted as part of the Cleanup Action Plan which describes the monitoring.

4.7 SCHEDULE FOR IMPLEMENTATION

TPH in soil - The interim action soil cleanups (which are adopted as the final soil cleanup) were completed in 2017. The engineering controls (i.e., capping) were implemented during final SR 522 roadway construction, in 2013. Institutional controls (environmental covenant) are anticipated to be implemented once the final Agreed Order is effective.

Arsenic in ground water - Institutional controls (environmental covenant) and monitoring are anticipated to be implemented once the final Agreed order is effective.

4.8 INSTITUTIONAL/ENGINEERING CONTROLS

Institutional Controls will be applied to the petroleum in soil and arsenic in ground water impacts. The main component would be environmental covenants restricting access to soil and ground water, as follows:

1. Remnant contaminated soil under roadway – leave in place and implement:
   - Engineering controls – paved SR 522 roadway capping petroleum impacted soils.
   - Institutional controls – implement environmental covenants for area shown in Figure 2)
2. Ground water arsenic – include institutional controls in new environmental covenant for the arsenic impacted area and provide compliance monitoring for ground water with option to remove arsenic from the covenant if monitoring shows naturally elevated concentrations unrelated to historical or current contamination at the site. For arsenic in ground water, the institutional control could consist of an environmental covenant that documents remaining arsenic contamination in ground water, prohibits withdrawal and use for any purpose other than monitoring, site investigation, or construction-related activities with notification and approval by Ecology. A request to lift the covenant can be made to Ecology if compliance monitoring from the site shows that the arsenic persists after historical ground water contamination and the petroleum hydrocarbon contamination has not been detected for an appropriate period of time (eight quarters of monitoring). If arsenic remains at elevated concentrations over a sufficiently long time period with no other detections of petroleum hydrocarbon or solvent contamination, this data can be used to demonstrate that the elevated concentrations represents a locally high

natural background for arsenic. Based on this evidence, a request can be made to remove the institutional controls for ground water at the site.

The environmental covenant will document the contamination in soil and ground water. An environmental covenant could prohibit soil excavation and ground water withdrawal for any purpose other than monitoring, and/or site investigation. Excavation or ground water withdrawal for construction-related activities will require notification and approval by Ecology.

4.9 PUBLIC PARTICIPATION

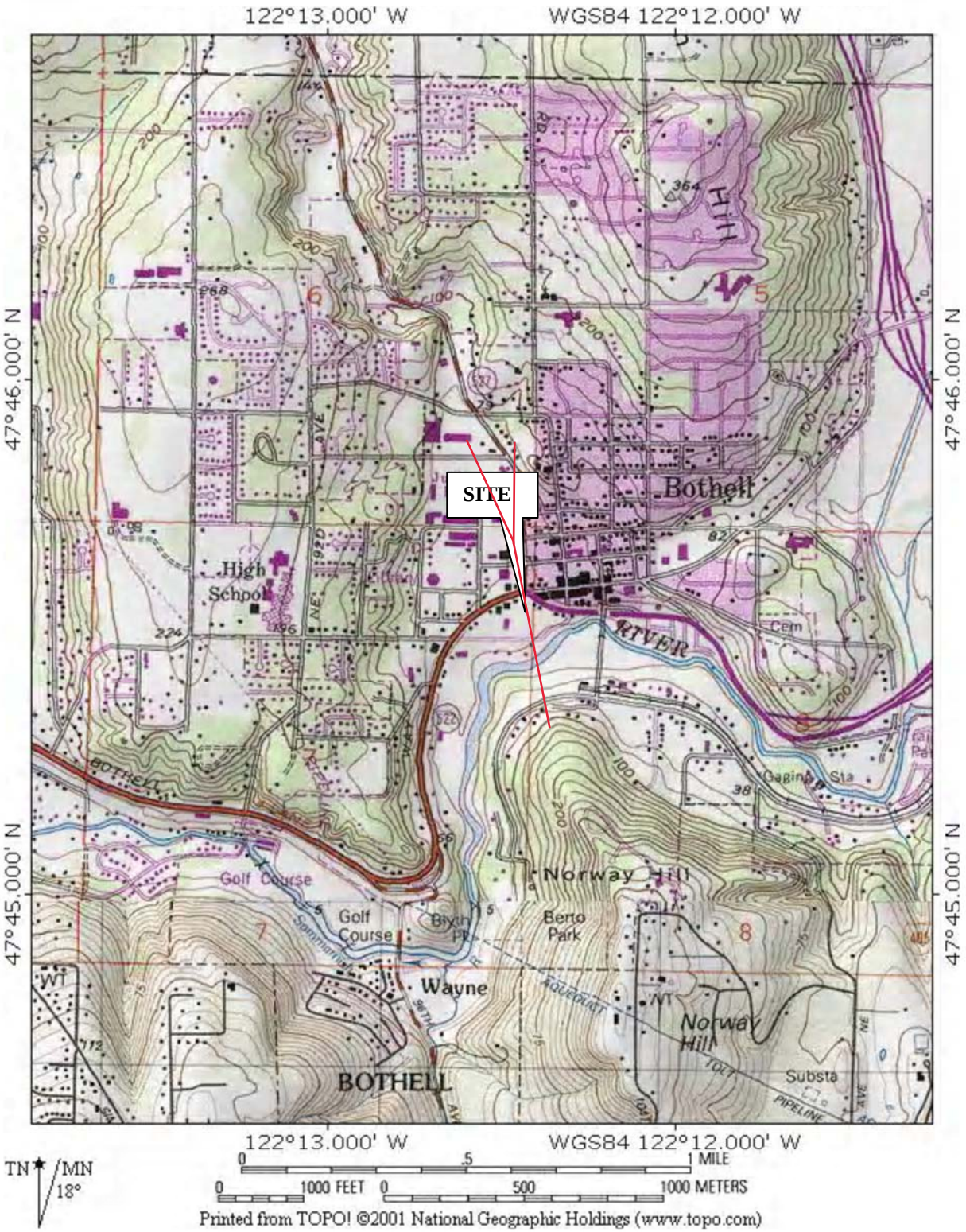
The draft CAP was distributed for public review and comment last April 12 through May 11, 2018. Public participation procedures will be outlined in a Public Participation Plan prepared by Ecology.

Table 1. Potential Applicable or Relevant and Appropriate Requirements (ARARs)

ARAR	Description	Applicability
Soil		
Model Toxics Control Act (WAC 173-340-740, -747)	MTCA regulates the investigation and cleanup of releases to the environment that may pose a threat to human health or the environment. Establishes cleanup levels for soil, including derivation of soil concentrations protective of groundwater.	MTCA cleanup levels are applicable to Site soil.
Groundwater		
Safe Drinking Water Act, Primary Drinking Water Regulations (40 Code of Federal Regulations [CFR] 141.50 and 141.61(a))	These regulations protect the quality of public drinking water supplies through regulation of chemical parameters and constituent concentrations as maximum concentration limits (MCLs).	MCLs are potentially relevant and appropriate where groundwater is a potential source of drinking water.
Model Toxics Control Act (WAC 173-340-720)	MTCA regulates the investigation and cleanup of releases to the environment that may pose a threat to human health or the environment. Establishes cleanup levels for groundwater.	MTCA cleanup levels are applicable to Site groundwater.
Surface Water		
Clean Water Act, Section 304, National Recommended Water Quality Criteria, EPA Office of Science and Technology (4304T, 2004).	There are no ambient water quality criteria for PCE for protection of freshwater organisms.	Surface water quality criteria are potentially relevant and appropriate to ambient surface water quality for point-source discharges to Horse Creek.
Clean Water Act, National Pollutant Discharge Elimination System (40 CFR Part 122) and Washington State National Pollutant Discharge Elimination System Permit Program (WAC 173-220).	The National Pollutant Discharge Elimination System (NPDES) program requires that permits be obtained for point-source discharges of pollutants to surface water. Under this regulation, a point-source discharge to a surface water body cannot cause an exceedance of water quality standards in the receiving water body outside the mixing zone.	Substantive regulatory requirements of the NPDES permit program are potentially applicable to the direct discharge of treated groundwater to a surface water body such as Horse Creek or Sammamish River.
Clean Water Act's National Toxics Rule (NTR) (40 CFR 131.36)	Provides values that have to be met for point-source discharges to surface water.	Potentially applicable to point-source discharges to Horse Creek should remedial activities cause release to surface water. If applicable, these values would have to be met at the mixing zone boundary established for the discharge.
Clean Water Act, General Pretreatment Regulations (40 CFR Part 403).	The regulations limit pollutants in wastewater discharges to sanitary sewer systems to protect publicly owned treatment works (POTWs) from accepting wastewater that would damage their system or cause them to exceed their NPDES permit discharge limits.	These regulations are potentially applicable to the discharge of treated groundwater to City of Bothell POTWs.
Washington State Water Quality Standards for Surface Waters (WAC 173-201A)	Washington State water quality standards protect freshwater aquatic life by specifying protection criteria by stretch of surface waters. WAC 173-201A provides limitations on other parameters such as turbidity, temperature, dissolved oxygen, and pH for protection of organisms. Tributaries of waters whose uses are designated salmon and trout spawning, core rearing and migration, or extraordinary primary contact recreation are protected at the same level as the waters themselves.	The substantive requirements of this regulation are potentially applicable for remedial actions affecting Horse Creek.
Washington Surface Water Quality Standards, Short-Term Modifications (WAC 173-201A-410)	Washington State provides for short-term modifications of standards for specific water bodies on a short-term basis when necessary to accommodate essential activities, respond to emergencies, or to otherwise protect the public interest.	These would be potentially applicable to remedial actions affecting Horse Creek.
Model Toxics Control Act (WAC 173-340-730)	MTCA regulates the investigation and cleanup of releases to the environment that may pose a threat to human health or the environment. Establishes cleanup levels for surface water.	MTCA cleanup levels may be applicable to the Site if remedial activities cause a release to surface water.
Air		
National Emission Standards for Hazardous Air Pollutants (NESHAPs) (40 CFR Part 261)	Establishes specific emissions levels allowed for toxic air pollutants.	Applicable to treatment alternatives that may emit toxic pollutants to the air.
Washington Clean Air Act and Implementing Regulations (WAC 173-400; WAC 173-460; WAC 173-490)	WAC 173-400 requires air emissions at the Site boundary to fall below the acceptable source impact limit (ASIL). WAC 173-400 also requires control of fugitive dust emissions during construction and defines general emission discharge treatment requirements. WAC 173-460 requires systemic control of new sources emitting air pollutants. WAC 173-490 sets emission standards and source control for volatile organic compounds.	Applicable for air stripping/sparging remedial technology.
Model Toxics Control Act (WAC 173-340-750)	MTCA regulates the investigation and cleanup of releases to the environment that may pose a threat to human health or the environment. Establishes cleanup levels for air.	MTCA cleanup levels may be applicable to the Site if remedial activities cause a release to air.

Table 1. Potential Applicable or Relevant and Appropriate Requirements (ARARs)

ARAR	Description	Applicability
Miscellaneous		
Protection of Wetlands, Executive Order 11990 (40 CFR Part 6, Appendix A)	This executive order mandates that response actions taken by federal agencies must be designed to avoid long- and short-term impacts to wetlands. If remediation activities are located near/in wetlands, the activities must be designed to avoid adverse impact to the wetlands wherever possible, including minimizing wetlands destruction and preserving wetland values.	This Act would be potentially applicable to remedial activities at the Site.
Endangered Species Act (50 CFR Parts 17, 402)	Section 7 of the Endangered Species Act (ESA) and 40 CFR Part 402 require that federal agencies consider the effects of their proposed actions on federal listed species. It requires consultation between the agency proposing the action and the U.S. Fish and Wildlife Service (USFWS) or National Oceanic and Atmospheric Administration (NOAA) Fisheries, as appropriate. Preparation of a biological assessment is conducted, addressing the potential effects to listed species in the area and methods to minimize those effects.	The ESA is potentially applicable to remedial actions at the Site because the USFWS has determined that federal threatened species (bald eagle and bull trout) may use the project area. Therefore, they could potentially be affected by these actions.
Native American Graves Protection and Repatriation Act (43 CFR Part 10)	Native American Graves Protection and Repatriation Act regulations protect Native American burials from desecration through the removal and trafficking of human remains and “cultural items,” including funerary and sacred objects.	This Act is potentially applicable to remedial actions at the Site because it is possible that the disturbance of Native American materials could occur as a result of work in the stream bed or subsurface excavations elsewhere at the Site. Such materials are not known to be present at the Site, but could be inadvertently uncovered during soil or sediment removal.
National Historic Preservation Act (36 CFR Parts 60, 63, and 800)	National Historic Preservation Act (NHPA) regulations require federal agencies to consider the possible effects on historic sites or structures of actions proposed for federal funding or approval. Historic sites or structures as defined in the regulations are those on or eligible for the National Register of Historic Places, generally at least 50 years old.	This Act is potentially applicable to stream bed or other subsurface work at the Site. No such sites are known to be present in the area.
Washington Hazardous Waste Management Act (WAC 173-303)	Establishes standards for the generation, transport, treatment, storage, or disposal of designated dangerous waste in the state.	This regulation is potentially applicable to alternatives that would involve handling of contaminated media at the Site. The area of contamination policy allows contaminated media to be consolidated within the same area of a site without triggering Resource Conservation and Recovery Act or Washington dangerous waste regulations.
Department of Transportation of Hazardous Wastes (49 CFR 105 – 180)	Establishes specific U.S. Department of Transportation rules and technical guidelines for the off-site transport of hazardous materials.	Applicable to remedial activities that involve the off-site transportation of hazardous waste.
Washington Solid Waste Handling Standards (WAC 173-350)	Establishes standards for handling and disposal of solid non-hazardous waste in Washington.	These regulations are potentially applicable to solid nonhazardous wastes and are potentially relevant and appropriate to on-site remedial actions governing contaminated media management.
Washington Water Well Construction Act Regulations (WAC 173-160)	Provides requirements for water well construction.	These regulations are potentially applicable to the installation, operation, or closure of monitoring and treatment wells at the Site.



SITE VICINITY

FIGURE NO. 1

HWA GEOSCIENCES INC.

BOTHELL LANDING SITE
CLEANUP ACTION PLAN
BOTHELL, WASHINGTON

PROJECT NO. 2007-098-920

EXPLANATION OF SYMBOLS

- MW — MONITORING WELLS
- MW — DECOMMISSIONED WELLS
- SB — SOIL BORINGS
- CLEANUP CONFIRMATION SOIL SAMPLE > MTCA
- SOIL CLEANUP AREAS
- SITE
- HVOC PLUMES
- ORIGINAL PARCELS
- NEW PARCELS

N W E S

0 60 120 180 240 FEET

ULTRA CUSTOM CARE CLEANERS

Ultra Custom Care Cleaners HVOC Plume

BOTHELL LANDING TPH INSTITUTIONAL CONTROL AREA

BOTHELL SERVICE CENTER

Bothell Service Center HVOC Plume

NEW HORSE CREEK CHANNEL

LOT D

LOT E,F,G

BOTHELL LANDING SITE BOUNDARY

Riverside HVOC Plume

LOT C

CITY ROW

CITY PARCEL

BOTHELL PAINT

BOTHELL HERTZ

BOTHELL LANDING ARSENIC INSTITUTIONAL CONTROL AREA

FORMER HORSE CREEK CHANNEL

RIVERSIDE TPH

RIVERSIDE HVOC

NE 183RD STREET

NE 183rd ST

DAWSON STREET

MAIN ST

NE 180th ST

SR-527 BOTHELL WAY NE

HWA GEOSCIENCES INC.

BOTHELL LANDING
CLEANUP ACTION PLAN
BOTHELL WASHINGTON

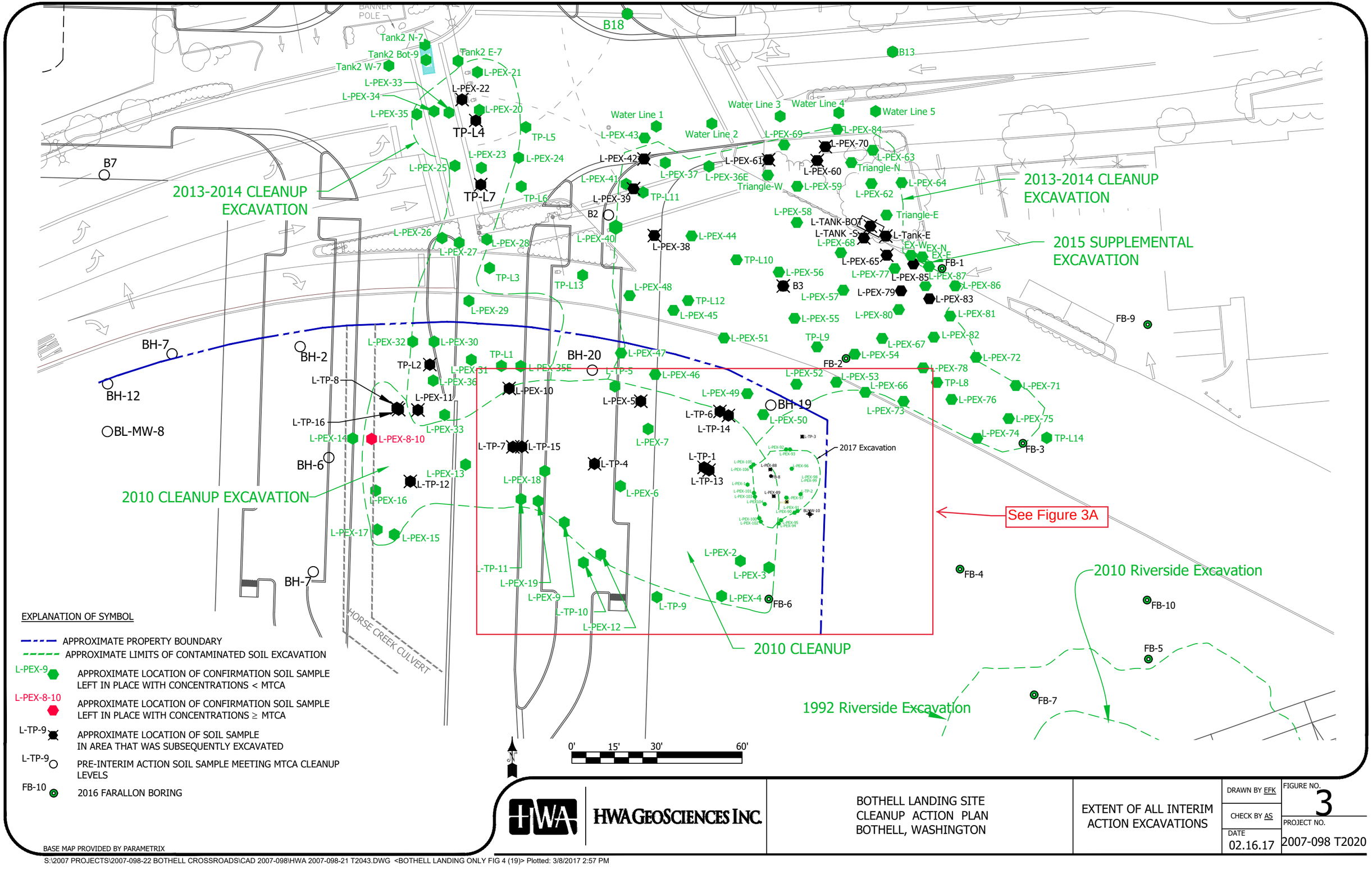
SITE LOCATION AND ADJACENT PROPERTIES

DRAWN BY BM
CHECK BY AS
DATE 5 25 18

FIGURE NO. 2

PROJECT NO. 2007-098 T2020

S:\2007 PROJECTS\2007-098-22 BOTHELL CROSSROADS\CAD 2007-098\HWA 2007-098-21 T2020 05.25.2018.DWG <Fig 2> Plotted: 5/27/2018 9:47 AM



EXPLANATION OF SYMBOL

- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE LIMITS OF CONTAMINATED SOIL EXCAVATION
- L-PEX-9 — APPROXIMATE LOCATION OF CONFIRMATION SOIL SAMPLE LEFT IN PLACE WITH CONCENTRATIONS < MTCA
- L-PEX-8-10 — APPROXIMATE LOCATION OF CONFIRMATION SOIL SAMPLE LEFT IN PLACE WITH CONCENTRATIONS ≥ MTCA
- L-TP-9 — APPROXIMATE LOCATION OF SOIL SAMPLE IN AREA THAT WAS SUBSEQUENTLY EXCAVATED
- L-TP-9 — PRE-INTERIM ACTION SOIL SAMPLE MEETING MTCA CLEANUP LEVELS
- FB-10 — 2016 FARALLON BORING

BASE MAP PROVIDED BY PARAMETRIX

HWA GEOSCIENCES INC.

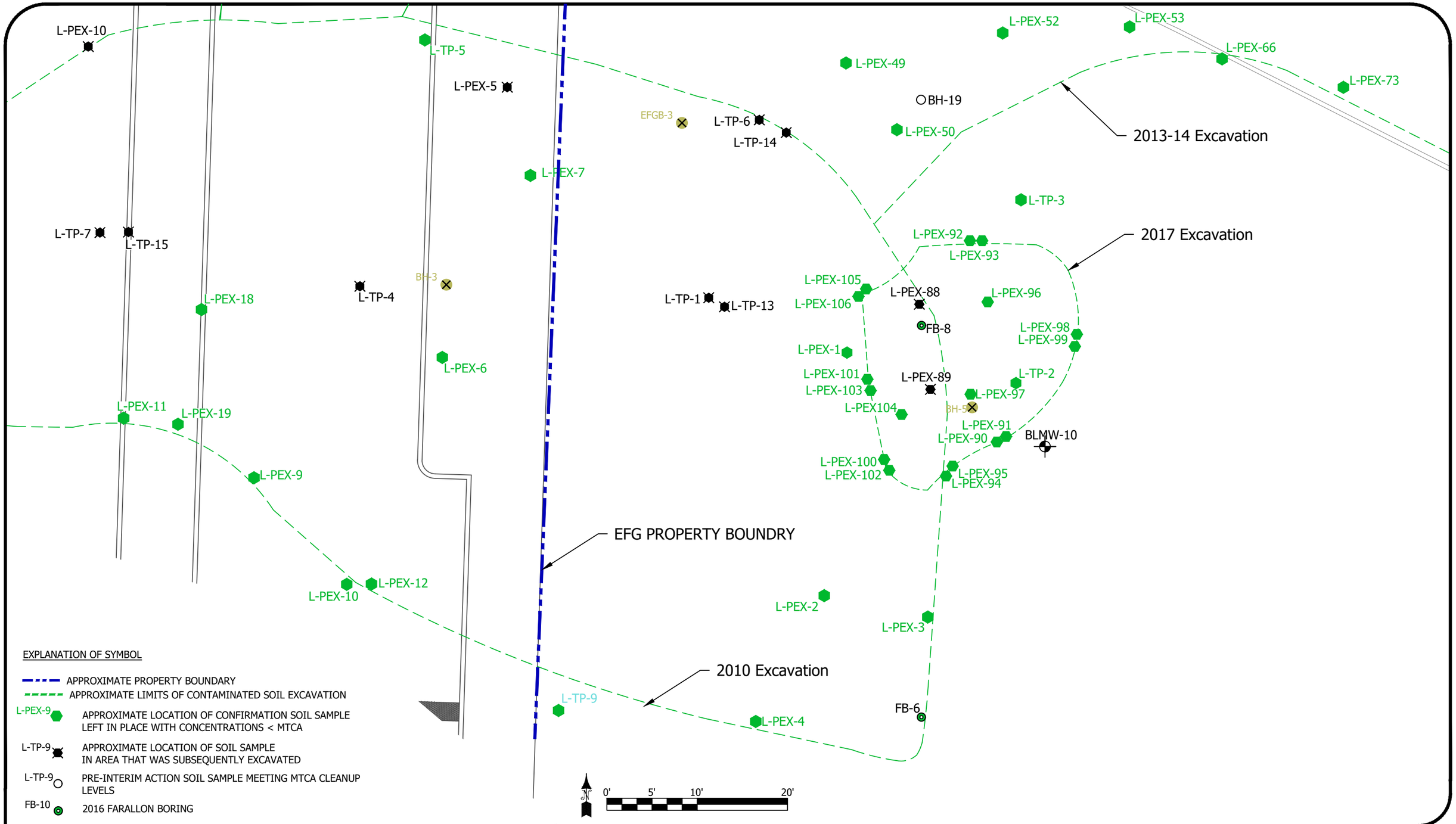
BOTHELL LANDING SITE
CLEANUP ACTION PLAN
BOTHELL, WASHINGTON

EXTENT OF ALL INTERIM ACTION EXCAVATIONS

DRAWN BY EFK
CHECK BY AS
DATE 02.16.17

FIGURE NO. 3
PROJECT NO. 2007-098 T2020

S:\2007 PROJECTS\2007-098-22 BOTHELL CROSSROADS\CAD 2007-098\HWA 2007-098-21 T2043.DWG <BOTHELL LANDING ONLY FIG 4 (19)> Plotted: 3/8/2017 2:57 PM



EXPLANATION OF SYMBOL

- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE LIMITS OF CONTAMINATED SOIL EXCAVATION
- L-PEX-9 — APPROXIMATE LOCATION OF CONFIRMATION SOIL SAMPLE LEFT IN PLACE WITH CONCENTRATIONS < MTCA
- L-TP-9 — APPROXIMATE LOCATION OF SOIL SAMPLE IN AREA THAT WAS SUBSEQUENTLY EXCAVATED
- L-TP-9 — PRE-INTERIM ACTION SOIL SAMPLE MEETING MTCA CLEANUP LEVELS
- FB-10 — 2016 FARALLON BORING

BASE MAP PROVIDED BY PARAMETRIX

HWA GEOSCIENCES INC.

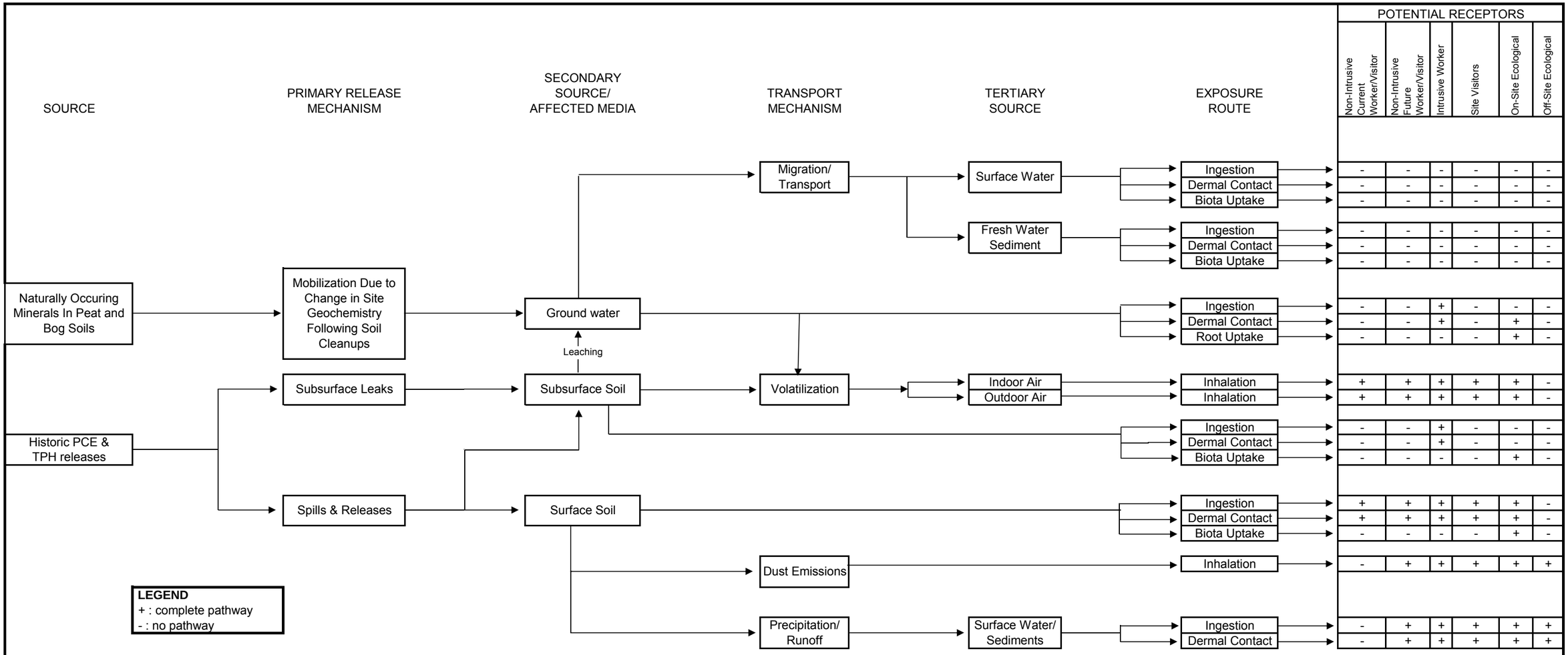
BOTHELL LANDING SITE
CLEANUP ACTION PLAN
BOTHELL, WASHINGTON

EXTENT OF 2017
INTERIM ACTION
EXCAVATION

DRAWN BY EFK
CHECK BY AS/NK/AY
DATE 02.16.17

FIGURE NO. 3A
PROJECT NO. 2007-098 T2043

S:\2007 PROJECTS\2007-098-22 BOTHELL CROSSROADS\CAD 2007-098\HWA 2007-098-21 T2043.DWG <RiverSide 2017 FIG 4> Plotted: 3/8/2017 2:50 PM



HWA GeoSciences Inc.

CONCEPTUAL SITE MODEL

BOTHELL LANDING SITE
CLEANUP ACTION PLAN
BOTHELL, WASHINGTON

FIGURE NO. 4

PROJECT NO. 2007-098-2020